	SIR C R REDDY COLLEGE OF ENGINEERING, ELURU
	[AUTONOMOUS]
	Approved by AICTE & Permanently Affiliated to JNTUK, Kakinada
	Accredited by NBA, Accredited by NAAC with 'A' Grade
	DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

CR24

(Applicable from the academic year 2025-26 onwards)

Course Structure & Syllabus

COMPUTER SCIENCE & ENGINEERING

II B. TECH I SEMESTER

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	SIR C R REDDY COLLEGE OF ENGINEERING, ELURU **[AUTONOMOUS]**
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	DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

B.Tech CSE (CR24-II Year I Semester COURSE STRUCTURE & SYLLABUS)

B.Tech.-II Year I Semester

S.No.	Category	Title	L	T	P	Credits
1	BS&H	Discrete Mathematics & Graph Theory	3	0	0	3
2	BS&H	Universal Human Values-Understanding harmony and Ethical Human Conduct	3	0	0	3
3	Engineering Science	Digital Logic & Computer Organization	3	0	0	3
4	Professional Core	Advanced Data Structures & Algorithm Analysis	3	0	0	3
5	Professional Core	Object Oriented Programming Through Java	3	0	0	3
6	Professional Core	Advanced Data Structures & Algorithm Analysis Lab	0	0	3	1.5
7	Professional Core	Object Oriented Programming Through Java Lab	0	0	3	1.5
8	Skill Enhancement Course	Python Programming	0	1	2	2
9	Audit Course	Environmental Science	2	0	0	-
Total			**16**	**2**	**8**	**20**

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B. TECH I SEMESTER: CSE

Common for CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]

DISCRETE MATHEMATICS & GRAPH THEORY

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To introduce the students to the topics and techniques of discrete methods and combinatorial reasoning.
2	To introduce a wide variety of applications. The algorithmic approach to the solution of problems is fundamental in discrete mathematics, and this approach reinforces the close ties between this discipline and the area of computer science.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to		
CO1	Build skills in solving mathematical problems.	K3
CO2	Comprehend mathematical principles and logic.	K4
CO3	Demonstrate knowledge of mathematical modeling and proficiency in using mathematical software.	K6
CO4	Manipulate and analyze data numerically and/or graphicallysing appropriate Software.	K3
CO5	How to communicate effectively mathematical ideas/results verbally or in writing	K1

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

UNIT–I:

Mathematical Logic-1

Propositional Calculus:

Statements and Notations, Connectives, Well Formed Formulas, Truth Tables, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Normal Forms- Disjunctive Normal Form, Conjunctive Normal Form, Principal Disjunctive Normal Form, Principal Conjunctive Normal Form, Ordering and Uniqueness of Normal Forms.

UNIT-II:

Predicate Calculus

Theory of Inference for Statement Calculus, Consistency of Premises, Indirect Method of Proof, Predicate Calculus: Predicates, Predicative Logic, Statement Functions, Variables and Quantifiers, Free and Bound Variables, Inference Theory for Predicate Calculus

Sets: Operations on Sets, Principle of Inclusion-Exclusion, Relations: Properties, Operations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering, Hasse Diagrams.

UNIT-III:

Functions and Recurrence Relations

Functions: Bijective, Composition, Inverse, Permutation, and Recursive Functions, Lattice and its Properties.

Recurrence Relations

Generating Functions, Function of Sequences, Partial Fractions, Calculating Coefficient of Generating Functions, Recurrence Relations, Formulation as Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, Method of Characteristic Roots, Solving Inhomogeneous Recurrence Relation

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UNIT-IV:

Graph Theory

Basic Concepts, Graphs, Subgraphs, Graph Representations: Adjacency and Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs.

Unit-V:

Multi Graphs

Multigraphs, Bipartite and Planar Graphs, Euler's Theorem, Graph Coloring and Covering, Chromatic Number, Trees and It's Properties, Spanning Trees, Prim's and Kruskal's Algorithms, Breadth-First Search(B F S) and Depth- First Search (D F S).

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J. P. Trembly and P. Manohar, Tata Mc Graw Hill.
2. Elements of Discrete Mathematics–A Computer Oriented Approach, C. L. Liuand D. P. Mohapatra, 3rd Edition, Tata Mc Graw Hill.
3. Theory and Problems of Discrete Mathematics, Schaum's Outline Series, Seymour Lipschutz and Marc Lars Lipson, 3rd Edition, Mc Graw Hill.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel and T. P. Baker, 2nd Edition, Prentice Hall of India.
2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby and Sharon Cutler Ross, P H I.
3. Discrete Mathematics, S. K. Chakraborthy and B. K. Sarkar, Oxford, 2011.
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata Mc Graw Hill.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

<u>**II B. TECH I SEMESTER: CSE**</u>

Common for CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]

UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY AND ETHICAL HUMAN CONDUCT

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	0	0	3	30 M	70 M	3 Hrs.

<u>COURSE OBJECTIVES:</u>

The main objective of the course is to:	
1	To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence.
3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

<u>COURSE OUTCOMES:</u>

Upon successful completion of the course, the student will be able to:		
CO1	Know the essentials of human values and skills, self-exploration, happiness and prosperity	K2
CO2	Understand and fulfill the role of a human being in maintaining harmony in self.	K2
CO3	Apply the role of a human being in ensuring harmony within the family and society	K3
CO4	Identify the role of a human being in ensuring harmony in nature.	K3
CO5	Distinguish between ethical and unethical practices and start working out the strategy to actualize a harmonious environment wherever they work	K4

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	-	-	-	2	-	2	-	-	-	2	-	1
CO2	-	-	-	-	-	2	-	2	2	-	-	2	-	1
CO3	-	-	-	-	-	2	-	2	2	-	-	2	-	1
CO4	-	-	-	-	-	2	-	2	-	-	-	2	-	1
CO5	-	-	-	-	-	2	-	2	2	-	-	2	-	1

Course Topics

The course has 28 lectures and 14 tutorials in 5 modules. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions.

The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

UNIT I   Introduction to Value Education (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)
Lecture 2: Understanding Value Education
Tutorial 1: Practice Session PS1 Sharing about Oneself Lecture
3: self-exploration as the Process for Value Education
Lecture4: Continuous Happiness and Prosperity – the Basic Human Aspirations
Tutorial 2: Practice Session PS2 Exploring Human Consciousness
Lecture 5: Happiness and Prosperity – Current Scenario
Lecture 6: Method to Fulfill the Basic Human Aspirations Tutorial
3: Practice Session PS3 Exploring Natural Acceptance

UNIT II   Harmony in the Human Being (6 lectures and 3 tutorials for practice session)
Lecture 7: Understanding Human being as the Co-existence of the self and the body.
Lecture 8: Distinguishing between the Needs of the self and the body
Tutorial 4: Practice Session PS4 Exploring the difference of Needs of self and body.

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Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 Exploring Harmony of self with the body

UNIT III   Harmony in the Family and Society (6 lectures and 3 tutorials for practice session)

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 Exploring the Feeling of Trust Lecture

15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 Exploring Systems to fulfil Human Goal

UNIT IV   Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session)

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 Exploring Co-existence in Existence.

UNIT V   Implications of the Holistic Understanding – a Look at Professional Ethics (6 lectures and 3 tutorials for practice session)

Lecture 23: Natural Acceptance of Human Values Lecture

24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 Exploring Steps of Transition towards Universal Human Order

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Practice Sessions for UNIT I – Introduction to Value Education
PS1 Sharing about Oneself
PS2 Exploring Human Consciousness PS3
Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being PS4
Exploring the difference of Needs of self and body
PS5 Exploring Sources of Imagination in the self PS6
Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society
PS7 Exploring the Feeling of Trust
PS8 Exploring the Feeling of Respect
PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)
PS10 Exploring the Four Orders of Nature
PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics
PS12 Exploring Ethical Human Conduct
PS13 Exploring Humanistic Models in Education
PS14 Exploring Steps of Transition towards Universal Human Order

READINGS:
Textbook and Teachers Manual
a. The Textbook
R R Gaur, R Asthana, G P Bagaria, *A Foundation Course in Human Values and Professional Ethics*, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-47-1
b. The Teacher's Manual
R R Gaur, R Asthana, G P Bagaria,*Teachers' Manual for A Foundation Course in Human Values and Professional Ethics,* 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

Reference Books
1. *JeevanVidya: EkParichaya,* A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. *Human Values*, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. *The Story of Stuff* (Book).
4. *The Story of My Experiments with Truth* - by Mohandas Karamchand Gandhi
5. *Small is Beautiful* - E. F Schumacher.
6. *Slow is Beautifu*l - Cecile Andrews

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7. *Economy of Permanence* - J C Kumarappa

8. *Bharat Mein Angreji Raj* – PanditSunderlal

9. *Rediscovering India* - by Dharampal

10. *Hind Swaraj or Indian Home Rule* - by Mohandas K. Gandhi

11. *India Wins Freedom* - Maulana Abdul Kalam Azad

12. *Vivekananda* - Romain Rolland (English)

13. *Gandhi* - Romain Rolland (English)

Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them.

Tutorial hours are to be used for practice sessions.

While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements.

In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than" extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting.

Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department.

Teacher preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

Online Resources:

1. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf

2. https://fdp-si.aicte-india.org/UHV-

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II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf

3. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf

4. https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf

5. https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf

6. https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf

7. https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf

8. https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385
    https://onlinecourses.swayam2.ac.in/aic22_ge23/preview

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

<u>**II B. TECH I SEMESTER: CSE**</u>

Common for **CSE, CSE [AI&ML], CSE [CS]**

DIGITAL LOGIC & COMPUTER ORGANIZATION

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

<u>COURSE OBJECTIVES:</u>

	The main objective of the course is to:
1	Understand fundamental concepts of digital logic and computer organization.
2	Learn Boolean algebra and its role in logic circuit design.
3	Analyze and design combinational and sequential circuits.
4	Explore computer architecture and organization principles.
5	Gain insight into memory hierarchy, I/O organization, and CPU design.

<u>COURSE OUTCOMES:</u>

	Upon successful completion of the course, the student will be able to:	
CO1	**Understand** the number systems, Boolean algebra, and logic gates.	K2
CO2	**Analyze** combinational and sequential circuits using fundamental digital logic principles	K4
CO3	**Understand** the basics of computer organization and architecture.	K2
CO4	**Analyze** the organization, structure, and functioning of various types of memory systems, evaluating their roles and performance in computer architecture	K4
CO5	**Understand** the data transfer between devices and optimization of I/O systems for efficient data access and processing.	K2

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	Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	-	2	-	-	-	-	-	-	-	-	2
CO2	3	3	3	-	3	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	3	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	3	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	3	-	-	-	-	-	-	-	-	2

Unit I:
Data Representation: Binary Numbers Fixed Point Representation. Floating Point representation. Number base conversions: Binary, decimal, Octal and Hexadecimal Numbers, Complements, Signed binary numbers, Binary codes.
Digital Logic Circuits: Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplifications (up to 5 variables).

Unit II:
Digital Logic Circuits: Combinational Circuits: Decoders, Encoders, Multiplexers, De-Multiplexers.
Sequential Circuit: Flip-Flops-SR, D, JK, T, Master-Slave, Registers, Shift Registers, Binary counters, Ripple counters.

Unit III:
Basic Structure of Computers: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture.
Computer Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

Unit IV:
Processor Organization: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Micro programmed Control, Parallel processing challenges – Flynn's classification – SISD, MIMD, SIMD, MISD
Memory Organization: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Secondary Storage

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Unit V:

Input/output Organization: Accessing I/O Devices, Interrupts – Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Exceptions, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces – PCI Bus, SCSI Bus, USB.

LEARNING RESOURCES

Text Books:

1. Digital Design, 6thEdition, M. Morris Mano, Pearson Education, 2018.

2. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6thedition, McGraw Hill,2023.

3. Computer Systems Architecture, M. Moris Mano, 3rdEdition, Pearson, 2017.

Reference Books:

1. Computer Organization and Architecture, William Stallings, 11thEdition, Pearson, 2022.

2. Computer Organization and Design, David A. Paterson, John L. Hennessy, Elsevier, 2004.

3. Fundamentals of Logic Design, Roth, 5thEdition, Thomson, 2003.

Online Learning Resources:

1. https://nptel.ac.in/courses/106/103/106103068/

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B. TECH I SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	**1**	**0**	**3**	**30 M**	**70 M**	**3 Hrs.**

COURSE OBJECTIVES:

	The main objective of the course is to:
1	Provide Knowledge on the time and space complexity of algorithms and advanced data structures.
2	Introduce Non Linear Data structures and their Operations
3	Provide knowledge on various algorithm design techniques such as Divide and Conquer, Greedy method and Dynamic Programming.
4	Demonstrate the algorithm design techniques like Backtracking and Branch and Bound to solve the problems
5	Provide knowledge on NP Hard and NP Complete Problems

COURSE OUTCOMES:

	Upon successful completion of the course, the student will be able to:	
CO1	Understanding Fundamentals of the time and space complexity of algorithms.	K2
CO2	Apply Non Linear Data structures and their Operations	K3
CO3	Develop Divide and Conquer, Greedy and Dynamic programming Algorithms for various problems	K3
CO4	Apply Back Tracking and Branch and Bound techniques to solve problems.	K3
CO5	Apply the theory of NP-hard and NP-complete problems.	K3

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	1	1	1
CO2	3	3	3	-	-	-	-	-	-	-	-	-	1	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	1	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	1	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-	1	-

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

SYLLABUS

Unit I:

Introduction: Definition- Algorithm, Algorithm Specification- Pseudo code Conventions, Recursive Algorithm, Performance Analysis– Space Complexity, Time Complexity, Asymptotic Notations.

Trees: AVL Trees–Creation, Insertion, Deletion Operations and Applications, B-Trees – Creation, Insertion, Deletion Operations and Applications, Heap Trees (Priority Queues)– Min and Max Heaps, Operations and Applications, Quad Trees, Splay Trees.

Unit II:

Graphs: Terminology, Representations, Elementary Graph Operations- BFS and DFS, Connected Components and Biconnected Components, Applications.

Divide and Conquer: The General Method, Binary Search, Quick Sort, Merge Sort, Strassen's Matrix Multiplication, and Convex Hull.

Unit III:

Greedy Method: The General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum cost Spanning Trees, Single Source Shortest Paths.

Dynamic Programming: The General Method, All pairs Shortest Paths, Single Source Shortest Paths– General Weights, Optimal Binary Search Trees, 0/1Knapsack, Travelling Salesperson problem

Unit IV:

Backtracking: The General Method, The 8-Queens Problem, Sum of Subsets problem, Graph Coloring, Hamiltonian cycles.

Branch and Bound: The General Method, 0/1Knapsack Problem, Travelling Sales Person Problem.

Unit V:

NP Hard and NP Complete Problems: Basic Concepts- Nondeterministic Algorithm, The classes NP Hard and NP Complete, Cook's theorem.

NP Hard Graph Problems: Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP).

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LEARNING RESOURCES

Text Books:

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni Sartaj; Mehta, Dinesh,2 Edition Universities Press
2. Fundamentals of Computer Algorithms, Ellis Horowitz, Sartaj Sahni and Rajasekharam, Galgotia publications Pvt. Ltd.

Reference Books:

1. Data Structures and program designing C,RobertKruse, Pearson Education Asia
2. An introduction to Data Structures with applications, Trembley & Sorenson, Mc Graw Hill
3. The Art of Computer Programming, Vol.1: Fundamental Algorithms Donald EKnuth, Addison-Wesley, 1997
4. Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta Galgottia Pub

E-Resources:

1. https://www.tutorialspoint.com/advanced_data_structures/index.asp
2. http://peterindia.net/Algorithms.html

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II B. TECH I SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	**1**	**0**	**3**	**30 M**	**70 M**	**3 Hrs.**

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To identify Java language components and how they work together in applications.
2	To learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries and collections.
3	To learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling, file I/O in Java applications.
4	To understand how to design applications with threads in Java.
5	To understand how to use JDBC APIs for program development.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Apply** basic Object Oriented Programming Concepts in Java.	K3
CO2	**Apply** the concept of Arrays, Collections and Strings to formulate and solve Computer Science problems.	K3
CO3	**Apply** the concepts of Inheritance, Interfaces and Packages for developing reusable programs.	K3
CO4	**Apply** the concepts of Multithreading and Exception Handling to build an efficient and error free code.	K3
CO5	**Use** File Input/output Streams and JDBC to manage data effectively.	K3

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
CO1	3	3	2	-	-	-	-	-	-	-	2	2	2	2
CO2	3	2	2	-	-	-	-	-	-	-	2	2	2	2
CO3	3	2	2	-	-	-	-	-	-	-	2	2	2	2
CO4	3	3	2	-	-	-	-	-	-	-	2	2	2	2
CO5	2	3	3	-	-	-	-	-	-	-	2	2	3	2

UNIT I:

Introduction to OOP: Basic concepts of OOP, Differences between Procedural and Object-Oriented Programming, Advantages of OOP, Applications of OOP.

Introduction to JAVA: Structure of JAVA, Features of JAVA, Data Types, Operators, JAVA Tokens, Control Structures.

Classes & Objects: Introduction, Class Declaration, Class Members, Declaration of Class and Objects, Access Control for Class Members, Static Variables and Methods, User input to programs, Command Line Arguments, Method overloading, this keyword.

UNIT II:

Constructors: Types of constructors and Constructor Overloading.

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Two-dimensional Arrays and Variable Size Arrays, Sorting and Searching in Arrays, Arrays as Vectors.

Collections: Array List, Hash Map, Hash Set and Dictionary

String Handling in Java: Introduction, Methods in String class, String Constant Pool and String Buffer class, Wrapper classes, Type Conversion.

UNIT III:

Inheritance: Introduction, Single inheritance, Multi-level inheritance, Hierarchical Inheritance, Method Overriding, Super Keyword, Final Keyword and Abstract Classes.

Interfaces: Introduction, Declaration of Interface, Implementing Multiple Inheritance, Extending interfaces, Adapter classes.

Packages: Introduction, Defining Package, Java. util Classes and Interfaces, Java. lang Classes, Importing Packages, Sub Packages, Access Modifiers.

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UNIT IV:

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords try, catch, throw, throws and finally Blocks, Multiple Catch Statements, Custom Exceptions, Nested try and catch Blocks.

Multithreaded Programming: Introduction, Thread Life Cycle, Extending Thread class, Implementing Runnable interface, Thread Priorities, Thread Synchronization.

UNIT V:

File IO: Introduction, Hierarchy of Stream classes, File Handling in Java, Java File Reader Class, Java File Writer Class, Byte Streams, Character streams.

Java Database Connectivity: Introduction, Structure of JDBC, JDBC Architecture, Types of JDBC Drivers, JAVA Database connection programs for ORACLE (create, insertion, deletion, retrieving).

LEARNING RESOURCES

TEXT BOOKS:

1. The complete Reference Java, 12th edition (2022), Herbert Schildt, Publisher: McGraw Hill
2. Jdbc Api Tutorial and Reference 3E (2003), by Maydene, Jon Ellis (Author), Jonathan Bruce (Author), Publisher: Addison-Wesley Professional..

REFERENCES:

1. Introduction to java programming, 9th edition (2014) by Y Daniel Liang, Publisher: Pearson
2. JAVA one step ahead, 1stedition (2017) Anitha Seth, B.L.Juneja, Oxford.
3. Programming with Java: A Primer 6E (2019) By Balagurusamy, Publisher: TMH.

E-Resources and other Digital Material:

1. www.javatpoint.com
2. www.w3schools.com
3. www.tutorialspoint.com
4. www.geeksforgeeks.org

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

CR24

II B. TECH I SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		---	----	3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Acquire practical skills in constructing and managing Data structures.
2	Apply the popular algorithm design methods in problem-solving scenarios.
3	Demonstrate a familiarity with major algorithms and data structures.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Implement** various Tree data structures and Graphs.	K3
CO2	**Implement** Divide and Conquer techniques on various problems.	K3
CO3	**Apply** the dynamic Programming and greedy techniques on various problems.	K3
CO4	**Implement** Back tracking and Branch-and-Bound approaches on various problems.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	1	1	1
CO2	3	3	3	-	-	-	-	-	-	-	-	-	1	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	1	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	1	-
Avg	3	2.5	3	-	-	-	-	-	-	-	-	1	1	1

Week-1:

1. Write a program to perform various insertion operations and deletion operations in an AVL tree

Week-2:

2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.

Week-3:

3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.

Week-4:

4. Implement BFT and DFT for given graph, when graph is represented by Adjacency Matrix.

Week-5:

5. Implement BFT and DFT for given graph, when graph is represented by Adjacency Lists

Week-6:

6. Write a program for finding the biconnected components in a given graph.

Week-7:

7. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).

Week-8.

8. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.

Week-9:

9. Implement Job Sequencing with deadlines using Greedy strategy.

Week-10:

10. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.

Week-11:

11. Implement N-Queens Problem Using Backtracking.

Week-12:

12. Implement Travelling Sales Person problem using Branch and Bound approach.

CONTENT BEYOND SYLLABUS:

13. Implementation of Double Hashing Technique.

Reference Books:

1. Fundamentals of Data Structures in C++, Horowitz Ellis, Sartaj Sahni, Mehta, Dinesh, 2nd Edition, Universities Press
2. Computer Algorithms/C++ Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition, University Press
3. Data Structures and program design in C, Robert Kruse, Pearson Education Asia
4. An introduction to Data Structures with applications, Trembley & Sorenson, McGraw Hill

Online Learning Resources:

1. http://cse01-iiith.vlabs.ac.in/
2. http://peterindia.net/Algorithms.html

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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II B. TECH I SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
				3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Practice object-oriented programming In the Java programming language.
2	Implement Classes, Objects, Methods, Inheritance, Collections, Runtime Polymorphism.
3	Illustrate inheritance, Exception handling mechanism, implement Packages.
4	Construct Threads, File I/O, JDBC Connectivity.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Construct** Basic programs using object-oriented programming principles such as classes, objects, constructors, and polymorphism	K3
CO2	**Apply** the concepts of Inheritance, Packages, exception handing, multi-threading and File I/O to develop reusable programs.	K3
CO3	**Develop** java application to interact with database by using relevant JDBC Driver.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	-	2	-	-	-	-	-	3	2	-	3
CO2	3	2	2	-	3	-	-	-	-	-	3	3	-	3
CO3	3	3	3	-	3	-	-	-	-	-	3	3	-	3
Avg	3	2.33	2	-	2.66						3	2.66		3

Week-1:

1. Write a JAVA program to display default value of all primitive data type of JAVA

2. Write a java program that display the roots of a quadratic equation $ax2 +bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Week-2:

1. Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.

2. Write a JAVA program to implement method overloading.

Week-3:

1. Write a JAVA program to implement this keyword.

2. Write a JAVA program to implement constructor overloading.

Week-4:

1. Write a JAVA program to search for an element in a given list of elements using binary search

2. Write a JAVA program to sort for an element in a given list of elements using bubble sort.

Week-5:

1. Write a JAVA program to implement Operations on Array list.

2. Write a JAVA program to implement Operations on Hash map.

Week-6:

1. Write a JAVA program to implement Operations on Dictionary.

2. Write a JAVA program to implement String Operations.

3. Write a JAVA program to implement String Buffer class.

Week-7:

1. Write a JAVA program to implement Single Inheritance

2. Write a JAVA program to implement multi-level Inheritance

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3. Write a JAVA program for abstract class to find areas of different shapes

Week-8:

1. Write a JAVA program that implements Runtime polymorphism (Method Overriding)

2. Write a JAVA program to implement "super" keyword.

3. Write a JAVA program to implement multiple Inheritance using Interface.

Week-9:

1. Write a JAVA program to implement simple Packages.

2. Write a JAVA program to implement sub-Packages.

Week-10.

1. Write a JAVA program for creation of Java Built-in Exceptions

    i) Arithmetic Exception.   ii) ArrayIndexOutofBoundsException

    iii) NumberFormatException.   iv) NullPointerException

2. Write a JAVA program Illustrating Multiple catch clauses

3. Write a JAVA program to implement user defined xception.

Week-11:

1. Write a JAVA program that creates threads by extending Thread class.First thread display "Good Morning "every 1 sec, the second thread displays "Hello "every 2 seconds and thethird 1 0 display "Welcome" every 3 seconds,(Repeat the same by implementing Runnable)

2. Write a JAVA program to implement Runnable Interface.

3. Write a program to implement priorities to Thread.

Week-12:

1. Write a JAVA program to implement Thread Synchronization (Multiplication tables)

2. Write a JAVA program to copy contents of file into another using Byte Oriented IO and Character Oriented IO.

Week-13:

1. Write a java program that connects to a database using JDBC in ORACLE

2. Write a java program to connect to a database using JDBC and insert values into it.

3. Write a java program to connect to a database using JDBC and delete values from it

CONTENT BEYOND SYLLABUS:

1. Write a Java program that connects a database using JDBC in MySQL and apply various operations on it.

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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II B. TECH I SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

PYTHON PROGRAMMING (SKILL ENHANCEMENT COURSE)

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
	SEC	2	0	2	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

	The main objective of the course is to:
1	Introduce core programming concepts of Python programming language.
2	Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3	Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

COURSE OUTCOMES:

S.No	Outcome	Knowledge Level
1	**Demonstrate** the ability to perform various operations on built-in data types and manipulate strings effectively.	K3
2	**Implement** modular programming concepts using functions and modules to solve computational problems	K3
3	**Implement** file handling operations and object-oriented programming concepts in Python to manipulate data and perform computational tasks.	K3
4	**Apply** data science methods and techniques to analyze and process real-time data.	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3: Substantial, 2: Moderate, 1: Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	2	-	-	-	-	-	-	-	2	2
CO2	3	3	3	2	2	-	-	-	-	-	-	-	3	2
CO3	3	3	3	2	3	-	-	-	-	-	-	-	3	3
CO4	3	3	3	3	3	2	-	-	-	-	-	-	3	3
Avg	3	2.75	2.75	2	2.5	2							2.75	2

UNIT-I:

Introduction to Python Programming Language, History of Python Programming Language, Installing and Using Jupyter Notebook, **Python Interpreter and Execution Model.**

Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, **Looping Statements**: while Loop, for Loop, **Loop Control Statements**: continue and break Statements, Catching Exceptions Using try and except Statement: **Basic exception handling,**
Using finally block.

Experiments:

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Demonstrate the following Operators in Python with suitable examples.
 i) Arithmetic Operators ii) Relational Operators iii) Assignment Operatorsiv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operatorsviii) Identity Operators
5. **Write a program to check if a given string is a palindrome.**
6. Write a program to print multiplication table of a given number.

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UNIT-II:

Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.

Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement, **Nested Lists**.

Experiments:

1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
   i. Addition ii. Insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.
7. **Write a program to demonstrate operations on a nested list.**

UNIT-III:

Dictionaries: Creating Dictionary, Accessing and Modifying key value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, **Dictionary Comprehensions**, del Statement.

Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Experiments:

1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to sum all the items in a given dictionary.
5. **Write a program to demonstrate dictionary comprehensions.**

UNIT-IV:

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to add, transpose and multiply two matrices.
5. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.
6. Write a Python program to demonstrate multiple inheritance.

UNIT-V:

Introduction to Data Science:

NumPy:

Introduction to NumPy, Creating NumPy Arrays, Array Attributes, Array Operations, Mathematical Functions, Array Concatenation

Pandas:

Introduction to Pandas, Series, DataFrame, Reading and Writing Data, Data Manipulation, Handling Missing Data.

Sample Experiments:

1. Create a 1D NumPy array and calculate the sum, mean, and standard deviation of its elements.
2. Create a 3x3 NumPy array and extract the first row, second column, and the element at the second row and third column.
3. Create a Pandas Series and compute the sum, mean, and maximum value of its elements.
4. Create a Pandas DataFrame with columns "Name," "Marks," and "Grade." Filter and display students who scored more than 80 marks.
5. Read a CSV file, fill missing values with the mean of the respective column, and display the first 5 rows of the cleaned DataFrame.

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Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

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	DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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(Applicable from the academic year 2025-26 onwards)

Course Structure & Syllabus

COMPUTER SCIENCE & ENGINEERING

II B. TECH II SEMESTER

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	DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

B.Tech CSE (CR24-II Year II Semester COURSE STRUCTURE & SYLLABUS)

B.Tech.-II Year II Semester

S.No.	Category	Title	L	T	P	Credits
1	Management Course-I	Managerial Economics and Financial Analysis	2	0	0	2
2	Engineering Science/ Basic Science	Probability & Statistics	3	0	0	3
3	Professional Core	Software Engineering	2	1	0	3
4	Professional Core	Operating Systems	3	0	0	3
5	Professional Core	Database Management Systems	3	0	0	3
6	Professional Core	Database Management Systems Lab	0	0	3	1.5
7	Professional Core	Operating Systems Lab	0	0	3	1.5
8	Skill Enhancement Course	Full Stack Development-I or Any of the APSCHE offered skill oriented course	0	1	2	2
9	BS&H	Design Thinking & Innovation	1	0	2	2
Total			**14**	**2**	**10**	**21**
Mandatory Community Service Project Internship of 08 weeks duration during summer vacation						

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DEPARTMENT OF COMPUTER SCIENCE &ENGINEERING

II B.TECH II SEMESTER: CSE

Common for **CSE, CSE[CS]**

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30M	70 M	3 Hrs.

COURSE OBJECTIVES:

	The main objective of the course is to:
1	To inculcate the basic knowledge of micro economics and financial accounting
2	To make the students learn how demand is estimated for different products, input output relationship for optimizing production and cost
3	To Know the Various types of market structure and pricing methods and strategy
4	To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
5	To provide fundamental skills on accounting and to explain the process of preparing financial statements.

COURSE OUTCOMES:

	Upon successful completion of the course, the student will be able to:	
CO1	**Understand** the fundamental concepts of Economics, estimating the Demand elasticity and Demand forecasting methods.	K2
CO2	**Apply** the basic concepts of production, cost & break-even analysis.	K3
CO3	**Have Knowledge** on forms of Business organization & conditions of different market structure & pricing policies.	K3
CO4	**Utilize** the knowledge on Accounting & Financing Analysis for preparation and interpretation of Financial Statements.	K3
CO5	**Make use** of the concepts related to Capital & Capital Budgeting.	K4

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CO-PO/PSOMAPPING

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
CO1	-	-	-	-	-	2	2	-	-	-	-	-	1	1
CO2	2	-	-	-	-	2	-	-	-	-	-	-	1	1
CO3	2	3	-	-	-	-	-	-	2	-	-	-	1	1
CO4	3	-	-	-	-	-	-	-	-	-	-	-	1	1
CO5	3	-	-	-	-	-	-	-	-	-	2	-	1	1

Unit I:

Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods.

Unit II:

Production and Cost Analysis: Introduction – Nature, meaning, significance, functions and advantages. Production Function- Isoquants and Isocosts, - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behaviour-Break-Even Analysis(BEA) –Determination of Break Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

Unit III:

Business Organizations and Markets: Introduction–Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly, Monopolistic Competition– Oligopoly-Price-Output Determination-Pricing Methods and Strategies.

Unit IV:

Introduction to Financial Accounting & Analysis: Introduction to Double Entry System – Accounting Cycle- Journal, Ledger. Trail balance – Preparation of Financial Statements Account-Profit & Loss Account and Balance Sheet- Ratio Analysis (Simple Problems) Trading

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Unit V:

Capital and Capital Budgeting: Meaning of Capital and Capital Budgeting – Need for Capital Budgeting- Capital budgeting process-Techniques of Capital Budgeting Traditional and Modern Methods.

Text books:

1. R.L.Varshney & K.L.Maheswari – Managerial Economics Publisher : Sultan Chand & Sons,2014, ISBN: 81-8054-914-4
2. A.R.Aryasri, Third Edition-Managerial Economics & Financial Analysis , 3/e, Tata MC-Graw-hill Publishing Company Limited, 7 West Patel Nagar, New Delhi-110008, Copy rights: 2008

References:

1. Salvatore D – Managerial Economics – Principles & World Wide Applications, 2012, Oxford University Press. U.S.A
2. Ahuja HI - Managerial Economics Schand, 9 th Edition, 2007, Schand publishing.
3. S.A.Siddiqui & A.S.Siddiqui- Managerial Economics and Financial Analysis, New Age International, 2006.
4. Domnick Salvatore : Managerial Economics in a Global Economy Cengage, 1993, New York MC Grew Hill.

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II B.TECH II SEMESTER: CSE

Common for CSE, CSE [AI&ML]

PROBABILITY AND STATISTICS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
--	--	**3**	**0**	**0**	**3**	**30M**	**70 M**	**3 Hrs.**

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To familiarize the students with the foundations of probability and statistical methods.
2	To impart probability concepts and statistical methods in various applications Engineering.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Classify the concepts of data science and its importance	K2
CO2	Interpret the association of characteristics and through correlation and regression tools	K4
CO3	Apply discrete and continuous probability distributions.	K3
CO4	Design the components of a classical hypothesis test	K3
CO5	Infer the statistical inferential methods based on small and large sampling tests.	K4

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	-

Syllabus:

UNIT I:

Descriptive Statistics and Methods for Data Science

Statistics Introduction, Population vs Sample, Collection of Data –types of data – Primary and Secondary Data, Types of Variables: Dependent and Independent, Measures of Central Tendency, Measures of Variability, Skewness (absolute measures) and Kurtosis.

UNIT II:

Correlation and Regression

Correlation: Correlation Coefficient, Rank Correlation. Linear Regression: Straight Line, Regression Coefficients and Properties. Curve Fitting: Principle of least squares, Fitting of straight line, Parabolic curves and Exponential curves.

UNIT III:

Probability & Distributions

Probability, Conditional Probability and Bayes' Theorem, Random Variables – Discrete and Continuous Random Variables, Distribution Functions: Probability Mass Function (PMF), Probability Density Function (PDF), Cumulative Distribution Function (CDF), Mathematical Expectation and Variance, Binomial, Poisson, Uniform, and Normal Distributions.

UNIT IV:

Sampling Theory

Introduction – Population and Samples – Sampling distribution of Means and Variance — Maximum likelihood estimate, Maximum error of estimate – Central limit theorem (without proof), Point and Interval estimations ,Estimation using t, Chi-square, and F-distributions.

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UNIT V:

Tests of Hypothesis

Introduction, Hypothesis – Null and Alternative Hypothesis, Type I and Type II Errors, Level of Significance – One-tail and Two-tail Tests, Test of Significance for Large and Small Samples: Single and Difference of Means, Single and Two Proportions, Ratio of Variance.

Learning Resources

Text Books

1. Miller and Freunds, Probability and Statistics for Engineers, 7th Edition, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11th Edition, Sultan Chand & Sons Publications, 2012.

References

1. Shron L. Myers, Keying Ye, Ronald E. Walpole, Probability and Statistics for Engineers and Scientists, 8th Edition, Pearson, 2007.
2. Jay L. Devore, Probability and Statistics for Engineering and the Sciences, 8th Edition, Cengage.
3. Sheldon M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, 4th Edition, Academic Foundation, 2011.
4. Johannes Ledolter and Robert V. Hogg, Applied Statistics for Engineers and Physical Scientists, 3rd Edition, Pearson, 2010.

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SIR C R REDDY COLLEGE OF ENGINEERING, ELURU [AUTONOMOUS]

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B. TECH II SEMESTER: CSE

Common for CSE, CSE [AI&DS]

SOFTWARE ENGINEERING

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	To introduce various software process models.
2	To understand the types of software requirements and SRS document.
3	To know the different software design and architectural styles.
4	To learn the Software Testing strategies, Implementation issues used in software development.
5	To know about quality control and maintenance.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Understand** basic concepts of software engineering, evolution of software and Notable changes in software development Practices.	K2
CO2	**Apply** Software Project Management techniques and Requirements Analysis And Specification	K3
CO3	**Design** Scalable, modular and user-friendly systems using structured and function-oriented approaches.	K4
CO4	**Implement** different Coding And Testing techniques and Software Reliability And Quality Management	K3
CO5	**Apply** Software Maintenance and Software Reuse techniques	K3

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	2	-	-	2	2	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	2	3	-	-	2
CO3	3	2	3	-	-	-	-	2	2	2	3	-	-	2
CO4	3	2	3	-	2	-	-	2	2	2	-	-	-	2
CO5	3	-	2	-	2	-	-	2	2	2	-	-	-	2

UNIT I:

Introduction: Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

Software Life Cycle Models: Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

UNIT II:

Software Project Management: Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.

Requirements Analysis And Specification: Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification.

UNIT III:

Software Design: Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. approaches to software design.

Function-Oriented Software Design: Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.

User Interface Design: Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

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UNIT IV:

Coding And Testing: Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing**,** Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.

Software Reliability And Quality Management: Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000.SEI Capability maturity model. Few other important quality standards, and Six Sigma**.**

UNIT V:

Software Maintenance: Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

Software Reuse: reuse-definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

LEARNING RESOURCES

Text Books:

1. Fundamentals of Software Engineering, Rajib Mall, 5thEdition, PHI.
2. Software Engineering A Practitioner's Approach, Roger S. Pressman, 9thEdition, Mc-Graw Hill International Edition.

Reference Books:

1. Software Engineering, Ian Sommerville,10thEdition, Pearson.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.

e-Resources:

1. https://nptel.ac.in/courses/106/105/106105182/
2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_sh ared/overview
3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_s hared/overview

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B. TECH II SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE[CYS]**

OPERATING SYSTEMS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Students will learn how Operating System is Important for Computer System.
2	To make aware of different types of Operating System and their services.
3	To learn different process scheduling algorithms, synchronization, Deadlock Techniques to achieve better performance of a computer system.
4	To learn virtual memory concepts and secondary storage memory.
5	Illustrate Security and Protection Mechanism in Operating System.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to		
CO1	**Understand** the basic principles, services of operating systems.	K2
CO2	**Analyze** the Various process scheduling Algorithms to improve the system throughput.	K4
CO3	**Analyze** the memory management strategies in OS to optimize the memory utilization.	K4
CO4	**Analyze** the mechanisms used for process synchronization, deadlock prevention and detection.	K4
CO5	**Apply** various file allocation methods, fundamentals of Protection techniques in OS to secure data integrity and accessibility.	K3

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
CO1	3	-	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	2
CO3	3	3	2	-	-	-	-	-	-	-	-	-	-	2
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	3
CO5	3	3	2	-	-	-	-	-	-	-	-	2	-	3

UNIT I

Introduction to Operating Systems: Overview of Operating systems, Types of operating systems, operating systems concepts, operating systems services, User and Operating System Interface, Computing environments, Free and Open-Source Operating Systems, Introduction to System calls, System programs, System calls types and Operating system Design and Implementation.

UNIT-II:

Process Management – The process, Process concepts, Process State Diagram, Process control block, Operations on Processes, Process Scheduling- Scheduling Queues, Schedulers, Inter process Communication,
Multithreading: Threads, Multithreading models, Thread libraries, threading issues.
Process Scheduling- Basic Concepts, Scheduling Criteria, and Scheduling Algorithms FCFS, SJF,SRTF, Priority and Round Robin, Multi-level Queue and Multi-level Feedback queue scheduling algorithms.

UNIT-III:

Memory Management: Introduction, Swapping, Contiguous Memory Allocation and Frame Allocation methods, Paging, structure of the Page Table, Segmentation.
Virtual Memory Management: Virtual Memory, Demand Paging, Page-Replacement Algorithms and Thrashing.

UNIT-IV:

Concurrency control: Process Synchronization, The Critical- Section Problem, Petersons Solution, MUTEX, Semaphores, Monitors, Classical Problems of Synchronization.
Principles of Deadlock – System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

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UNIT-V:

File system implementation - The concept of a file, Access Methods, File operations Directory structure, File system mounting, file sharing, File system structure, allocation methods and free- space management.

Mass-storage structure overview of Mass-storage structure, Disk scheduling, Device drivers,

Protection and Security: Goals of protection, Principles and domain of protection, Access matrix, Access control, Introduction to Program threats, System and network threats, Cryptography for security

Case Studies: IOS and ANDROID.

Text Books:

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

Reference Books:

1.Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018
2.Operating Systems: A Concept Based Approach, D.M Dhamdhere, 3rd Edition, McGraw- Hill, 2013

Online Learning Resources:

https://nptel.ac.in/courses/106/106/106106144/
http://peterindia.net/OperatingSystems.html

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

II B. TECH II SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

DATABASE MANAGEMENT SYSTEMS

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		3	1	0	3	30 M	70 M	3 Hrs.

COURSE OBJECTIVES:

	The main objective of the course is to:
1	Introduce database management systems and to give a good formal foundation.
2	Introduce the concepts of SQL as a universal Database language and to give a good formal foundation on the relational model of data and usage of Relational Algebra.
3	Demonstrate the principles behind systematic database design approaches by covering conceptual design.
4	Demonstrate the principles behind systematic database design approaches by covering logical design through normalization.
5	Provide an overview of physical design of a database system by discussing Transaction Processing, Concurrency Control and Recovery Protocols.

COURSE OUTCOMES:

	Upon successful completion of the course, the student will be able to:	
CO1	**Understand** the basic concepts of database management systems.	K2
CO2	**Apply** SQL or Relational Algebra operations to find solutions for a given application.	K3
CO3	**Apply** E-R and Relational models for creating databases.	K3
CO4	**Apply** normalization techniques to improve database design.	K3
CO5	**Analyze** a real time scenario to use Conceptual and Relational data models for designing the database.	K4

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	3	2	2	2	-	-	-	2	-	2	-	2	2
CO3	2	2	2	2	-	-	-	-	2	-	-	-	-	-
CO4	2	2	2	2	-	-	-	-	2	-	-	-	-	-
CO5	2	2	2	2	-	-	-	-	2	-	-	-	-	-

UNIT I:
INTRODUCTION TO DATABASES:
Characteristics of the Database Approach, Advantages of using the DBMS Approach, A Brief History of Database Applications, Data Models, Schemas and Instances, Three-Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System environment, Centralized and Client-Server Architecture for DBMSs.

UNIT II:
RELATIONAL MODEL:
The Relational Model Concepts, Relational Model Constraints and Relational Database Schemas.
Basic SQL: SQL Data Definition and Data Types, Specifying Constraints in SQL, Basic retrieval Queries in SQL, INSERT, DELETE AND UPDATE Statements in SQL.
Complex SQL: More complex SQL retrieval queries Advanced Queries, Specifying constraints as Assertions and Actions as Triggers, Views in SQL.
Relational Algebra: Unary Relational Operations: Select and Project, Relational Algebra Operations.
Binary Relational Operations: Join and Division, Examples of Queries in Relational Algebra.

UNIT III:
CONCEPTUAL DATA MODELING:
High-Level Conceptual Data Models for Database Design, A Sample Database Application, Entity Types, Entity Sets, Attributes and Keys, Relationship Types, Relationship Sets, Roles, and Structural Constraints, Weak Entity Types, Refining the ER Design, ER Diagrams, Naming Conventions and Design Issues, Relationship Types of Degree Higher Than Two. Relational Database Design Using ER-to- Relational Mapping.
Case Study: Conversion of an ER Diagram to Relations.

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UNIT IV:

DATABASE DESIGN THEORY AND NORMALIZATION:
Normal forms based on Primary Keys, General definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multi valued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

Case Study: Apply Normalization to Employee Organization.

UNIT V:

Transaction Processing: Introduction, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability & Serializability, Transaction Support in SQL.

Introduction to Concurrency Control: Two-Phase Locking Techniques for concurrency control: Types of Locks and System Lock Tables, Guaranteeing Serializability by Two-Phase Locking.

Introduction to Recovery Protocols: Recovery Concepts, No- UNDO/REDO Recovery Based on Deferred Update, Recovery Techniques Based on Immediate Update, Shadow Paging.

LEARNING RESOURCES

TEXT BOOKS:
1. Fundamentals of Database Systems, Ramez Elmasri,ShamkantB. Navathe, Seventh edition, Pearson.

REFERENCES:
1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH.
2. Database System Concepts,5th edition, Silberschatz, Korth, Sudarsan,TMH.

e-Resources and other Digital Material:

1. https://nptel.ac.in/courses/106/105/106105175/
2. https://onlinecourses.nptel.ac.in/noc21_cs04/
3. https://nptel.ac.in/courses/106/106/106106093/

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II B. TECH II SEMESTER: CSE

Common for **CSE, CSE [AI&ML], CSE [CS]**

DATABASE MANAGEMENT SYSTEMS LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
				3	1.5	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Populate and query a database using SQL DDL/DML Commands
2	Declare and enforce integrity constraints on a database
3	Writing Queries using advanced concepts of SQL
4	Programming PL/SQL including procedures, functions, cursors and triggers
5	Develop DBMS project using PHP & MYSQL

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Apply SQL commands to create**,** alter**,** and drop tables, define constraints, and insert data into tables.	K3
CO2	Apply aggregate functions, grouping data, filtering grouped results, and creating and managing views	K3
CO3	Apply PL/SQL programming techniques, including exception handling, transaction control, and Creating procedures, functions, and triggers.	K3
CO4	Develop Java programs to connect to databases using JDBC.	K3
CO5	Implement DBMS Project using HTML,PHP & MYSQL	K3

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
CO1	3	2	3	-	3	-	-	-	-	-	-	-	3	-
CO2	3	3	3	-	3	-	-	-	-	-	-	-	3	-
CO3	3	3	3	3	3	-	-	-	-	-	-	-	3	-
CO4	3	3	3	-	3	-	-	-	-	-	-	-	3	-
CO5	3	2	3	-	3	-	-	-	2	2	3	2	-	3
Avg	**3**	**2.8**	**3**	**3**	**3**	**-**	**-**	**-**	**2**	**2**	**3**	**2**	**3**	**3**

Week-1:

Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

Week-2:

Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.

Week-3:

Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

Week-4:

Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

Week-5:

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i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found) ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

ii. ii. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

Week-6:

Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISEAPPLICATION ERROR.

Week-7:

Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

Week-8:

Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

Week-9:

Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

Week-10:

Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

Week-11:

Write a Java program that connects to a database using JDBC insert values into it and delete values from it.

Week-12:

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Create DBMS Sample project using HTML, PHP & MYSQL (Ex: Insert & Retrieve Student records from front end i.e HTML/PHP)

CONTENT BEYOND SYLLABUS:

Implementation of Different Types of Joins

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DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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II B. TECH II SEMESTER: CSE

Common for **CSE, CSE[AI&DS]**

OPERATING SYSTEMS LAB

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
				3	**1.5**	**30**	**70**	**3 Hrs.**

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Provide insights into system calls, file systems, semaphores
2	Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
3	Implement Bankers Algorithms to Avoid the Dead Lock

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Understand the use of Linux environment for Unix Utilities and perform basic shell and file access control	K2
CO2	Examine process communication, process synchronization and usage of pthread library	K4
CO3	Solve various CPU scheduling and page replacement algorithms	K3
CO4	Interpret Bankers algorithm implementation for deadlock avoidance and prevention	K3
CO5	Analyze tasks of multiprogramming and file allocation strategies	K4

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	-	-	-	-	-	3
CO2	3	3	3	-	3	-	-	-	-	-	-	-	-	3
CO3	3	3	3	-	3	-	-	-	-	-	-	-	-	3
CO4	3	3	3	-	3	-	-	-	-	-	-		-	3
CO5	3	3	3	-	3	-	-	-	-	-	-	-	-	3
Avg	**3**	**3**	**3**	-	**3**	-	-	-	-	-	-	-	-	**3**

Week-1:

1. Practicing of Basic UNIX Commands.

2. Simulate UNIX commands like cp, ls, grep, etc., dir, cd, mkdir etc.

Week-2:

3. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir

4. Write a program to illustrate concurrent execution of threads using pthreads library**.**

Week-3:

5. Simulate the following CPU scheduling algorithms

a) FCFS   b) SJF

Week-4:

6. Simulate the following CPU scheduling algorithms

a) Priority b) Round Robin

Week-5:

7. Implement the following memory allocation methods for fixed partition

a) First fit b) Worst fit c) Best fit

Week-6:

8. Simulate Paging Technique of memory management.

Week-7:

9. Simulate the following page replacement algorithms

    a) FIFO   b) LRU   c) LFU

Week-8.

10. Control the number of ports opened by the operating system with

    a) Semaphore b) Monitors.

Week-9:

11. Write a program to solve producer-consumer problem using Semaphores.

Week-10:

12. Write a program to simulate the concept of Dining Philosophers Problem.

13. Write a C program to implement Reader's Writers Problem

Week-11:

14. Implement Bankers Algorithm for Dead Lock Avoidance

Week-12:

15. Implement Bankers Algorithm for Prevention.

Week-13:

16. Simulate the following file allocation strategies

    a) Sequential b) Indexed c) Linked

Week-14:

17. Download and install nachos operating systems and experiment with it.

<u>CONTENT BEYOND SYLLABUS:</u>

1. Write a C program to simulate the following file organization techniques a) Single level directory b) Two level directory c) Hierarchical
2. Write a C program to simulate disk scheduling algorithms a) FCFS b) SCAN c) C-SCAN

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II B. TECH II SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

FULL STACK DEVELOPMENT-I

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		-	1	2	2	30	70	3 Hrs.

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Construct static web pages by implementing appropriate HTML elements and attributes.
2	Evaluate the effectiveness of different CSS styling techniques in creating a user-friendly interface.
3	Develop and debug JavaScript code to create dynamic web page features and ensure data integrity through form validation.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	Construct and organize web pages using HTML elements like lists, links, images, tables, and forms.	**K3**
CO2	Apply CSS to style and format web pages, including colors, backgrounds, fonts, and layouts.	**K3**
CO3	Integrate JavaScript to enable interactivity, process input/output, and manage user interactions on web pages.	**K3**
CO4	Differentiate and build functional logic, iterative processes, and modular functions in JavaScript, utilizing both predefined and custom objects, to enhance web functionality.	**K4**
CO5	Compose comprehensive and visually coherent websites, establishing a foundation for advanced web development.	**K6**

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
CO1	3	-	3	-	2	-	-	-	-	-	-	-	-	3
CO2	3	3	2	-	3	-	-	-	-	-	-	2	-	3
CO3	3	2	3	2	3	-	-	-	-	-	-	3	-	3
CO4	3	2	3	3	3	-	-	-	-	-	-	3	-	3
CO5	3	2	3	3	3	-	-	-	-	-	-	3	-	3
Avg	**3**	**2**	**2.8**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**2.75**	**-**	**3**

Week 1: Lists, Links and Images

a. Write a HTML program, to explain the working of lists.

Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.

b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.

c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective profiles.

d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique.

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Week 2: HTML Tables, Forms and Frames

    a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)

    b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).

    c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).

    d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame à image, second frame à paragraph, third frame à hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

Week 3: HTML 5 and Cascading Style Sheets, Types of CSS

    a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)

    b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).

    c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).

    d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame à image, second frame à paragraph, third frame à hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

Week 4: Selector forms

    a. Write a program to apply different types of selector forms

        i. Simple selector (element, id, class, group, universal)

        ii. Combinator selector (descendant, child, adjacent sibling, general sibling)

        iii. Pseudo-class selector

        iv. Pseudo-element selector

        v. Attribute selector

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Week 5: CSS with Color, Background, Font, Text and CSS Box Model

    a.   Write a program to demonstrate the various ways you can reference a color in CSS.

    b.   Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.

    c.   Write a program using the following terms related to CSS font and text:

       i.   font-size   ii. font-weight   iii. font-style

       iv. text-decoration   v. text-transformation   vi. text-alignment

    d.   Write a program, to explain the importance of CSS Box model using
       i.   Content   ii. Border   iii. Margin   iv. Padding

Week 6: Applying JavaScript - internal and external, I/O, Type Conversion

    a.   Write a program to embed internal and external JavaScript in a web page.

    b.   Write a program to explain the different ways for displaying output.

    c.   Write a program to explain the different ways for taking input.

    d.   Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

Week 7: Java Script Pre-defined and User-defined Objects

    a.   Write a program using document object properties and methods.

    b.   Write a program using window object properties and methods.

    c.   Write a program using array object properties and methods.

    d.   Write a program using math object properties and methods.

    e.   Write a program using string object properties and methods.

    f.   Write a program using regex object properties and methods.

    g.   Write a program using date object properties and methods.

    h.   Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

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Week 8: Java Script Conditional Statements and Loops

a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".

b. Write a program to display week days using switch case.

c. Write a program to print 1 to 10 numbers using for, while and do-while loops.

d. Write aprogram to print data in object using for-in, for-each and for-of loops

e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,13 + 53+ 33 = 153]

f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1-1's)

Week 9: Java Script Functions and Events

a. Design a appropriate function should be called to display
   i. Factorial of that number
   ii. Fibonacci series up to that number
   iii. Prime numbers up to that number
   iv. Is it palindrome or not

b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
   i. Factorial of that number
   ii. Fibonacci series up to that number
   iii. Prime numbers up to that number
   iv. Is it palindrome or not

c. Write a program to validate the following fields in a registration page
   i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
   ii. Mobile (only numbers and length 10 digits)
   iii. E-mail (should contain format like xxxxxxx@xxxxxx.xxx)

CONTENT BEYOND SYLLABUS:

1. Mini Project

SIR C R REDDY COLLEGE OF ENGINEERING, ELURU
[AUTONOMOUS]
Approved by AICTE &Permanently Affiliated to JNTUK, Kakinada
Accredited by NBA, Accredited by NAAC with 'A' Grade

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

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II B.TECH II SEMESTER: CSE

Common for **CSE, CSE [AI&DS], CSE [AI&ML], CSE [CS]**

DESIGN THINKING & INNOVATION

Course Code	Category	Lecture	Tutorial	Practical	Credits	C.I.E.	S.E.E.	Exam Duration
		1	**0**	**2**	**2**	**30 M**	**70 M**	**3 Hrs.**

COURSE OBJECTIVES:

The main objective of the course is to:	
1	Bring awareness on innovative design and new product development.
2	Make the students to understand the basics of design thinking.
3	Familiarize the role of reverse engineering in product development.
4	Train how to identify the needs of society and convert into demand.
5	Introduce product planning and product development process.

COURSE OUTCOMES:

Upon successful completion of the course, the student will be able to:		
CO1	**Define** the concepts related to design thinking.	**K1**
CO2	**Explain** the fundamentals of Design Thinking and innovation.	**K2**
CO3	**Apply** the design thinking techniques for solving problems in various sectors.	**K3**
CO4	**Analyze** to work in a multidisciplinary environment.	**K4**
CO5	**Evaluate** the value of creativity.	**K5**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
CO1	3	3	2	-	-	-	-	-	2	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	2	-	-	-	3	-
CO3	-	3	3	2	-	2			3	-	2	-	-	3
CO4	-	-	-	-	-	-	-	-	3	3	2	-	-	3
CO5	-	-	-	-	3	-	-	-	3	-	-	2	2	3

SYLLABUS

UNIT – I   Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking. New materials in Industry.

UNIT - II   Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development.

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - III   Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - IV   Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT-V   Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

LEARNING RESOURCES

Text books:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.

2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.

2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.

3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e,

Rockport Publishers, 2010.

4. Chesbrough.H, The era of open innovation, 2003.

e-Resources and other Digital Material:

1.   https://nptel.ac.in/courses/110/106/110106124/
2.   https://nptel.ac.in/courses/109/104/109104109/
3.   https://swayam.gov.in/nd1 noc19 mg60/preview
4.   https://onlinecourses.nptel.ac.in/noc22 de16/preview